

Mbangala, which flows into the Ruaha. According to Mr. Thomson, the formidable range, called the Konde mountains, is simply the termination of a plateau which rises from an altitude of 3,500 feet in 8° 50' S. lat. to not more than 9,000 feet at the lake. Mr. Thomson was to leave for Lake Tanganyika on September 28, and we may fairly hope that by now he has completed his explorations, and is on his way back to the coast. The papers of the evening were "The Grand Canal and Yellow River of China," and "Hankow to Canton overland," by Mr. G. J. Morrison. During the journey referred to in the former, Mr. Morrison was enabled to examine some 200 miles of the Yellow River, a portion of which has materially altered since it was described by any traveller, and his observations are, therefore, very useful. Mr. Morrison, it may be noted, is of opinion that the Yellow River is now flowing in its natural channel, and that in former times it discharged its waters into the sea north of the Shantung promontory. His description of the condition of the Grand Canal is also interesting, as he looks at it from the point of view of a practical engineer. The other paper, from which only extracts were read, described a journey undertaken with the object of getting some idea of the country through which one of the great railway lines of the future may be expected to run, and a portion of which embraced the rich mineral field of Southern Hunan examined by Baron Richthofen a few years ago.

AN interesting piece of exploration has just been successfully accomplished by the Church Missionary Society's agents in Western Africa. In a small steamer they have ascended the River Binue from its confluence with the Niger to a point probably about 800 miles from the sea. The party penetrated 150 miles beyond Hamaruwa, which was reached by Dr. Baikie when in search of Dr. Barth in 1854, and a careful survey of the river has been executed.

M. PÉTRIMENT (*Bulletin* of Paris Anthropological Society, t. ii. fasc. 3), in confirmation of M. Madaillac's assertion that a blonde race existed in Persia, had engaged a Persian doctor, Mirzâ Mohammed, some time resident in Paris, to obtain definite information on this point. According to this gentleman there are about 2 per cent. of blonde persons in the Persian population, blonde children appearing in brunette families after the lapse of a generation or two. According to local tradition, the white men came from the north, and were *sheitans*, or demons; this evil character is still attached to blonde individuals in Persia, where they are generally impetuous and artful, and seldom possessed of a lymphatic temperament.

M. DE UJFALVY, in his recent travels through the Russian territories of Central Asia, has visited the lands of the Galtchas, Sarts, and Tadjiks, where he found that caste and patriarchal authority were rigidly observed. The people are Mussulmans, and consequently polygamists, and the women are held in great subjection. The Galtchas in their nomadic wanderings ascend the mountain-slopes of Kohistan in search of pasture. To the east of their country we would seem, although close to the plains of Pamir, to be on the extreme limits of the Aryan race, for here in the Kuldja district the oblique-eyed Mongolians begin to predominate. At this point, where the Mountains of Heaven form a line of division, the white and yellow races meet, and even overlap one another to some extent, although the strict observance of caste has hitherto prevented their complete fusion, and has left the Aryan races to form isolated ethnic groups in the midst of an otherwise Mongolian population. M. de Ujfalvy is at present engaged in completing the narrative of his travels in this part of Central Asia, and his observations on the distinct characters of the Galtchas and other kindred races can scarcely fail to afford valuable aid in the solution of the vexed question of the limits of demarcation between the Mongolian and Aryan races.

In No. 83 of the *Zeitschrift* of the Berlin Geographical Society Dr. Hildebrandt concludes the narrative of his journey from Mombassa to Kitue, and this is followed by some remarks on his measurements of heights in the Wakamba land. *Apropos* of the recent Karl Ritter celebration, we have two papers on that geographer; one by Pastor Tallin on Michael Servetus as a predecessor of Ritter and Humboldt, and the other by Dr. Marthe on what Ritter did for geography. In a letter from Gerhard Rohlfs, that traveller maintains that none of the greater carnivora are found in the Sahara, while, in reply, Drs. Ascherson and Hartmann endeavour to show that this statement must be received with some modifications. The *Verhandlungen*

(Nos. 1 and 9, Band vi.) of the same Society contains a paper by Herr Schütt on his travels in Central Africa.

Two important congresses will be held next year by the French geographers. The first will be held at Lyons, and will deliberate on the means of regulating the explorations of Africa by French travellers or colonists. The second will be held at Nancy in Summer, at the conclusion of the meeting of the French Association, which will meet at Rheims, on general subjects.

A DEPUTATION waited on the Lord Mayor last week to bespeak his patronage in behalf of Commander Cheyne's elaborate and expensive scheme for reaching the North Pole. The Lord Mayor promised the use of the Egyptian Hall to have the scheme "thrashed out" at a public meeting.

IN connection with letters from Lieut. Bove on the work of the North-East Passage Expedition, the *Bollettino* of the Italian Geographical Society publishes several sheets of illustrations of the natural features along the routes, heads of the natives met with, sledges, implements, and weapons, native houses, &c., besides two excellent maps.

THE *Bulletin* of the Paris Geographical Society for November contains a translation, by M. Barrande, of the memoir by the Russian Grand Duke Nicholas on the Amu and Uzboi. Also an important paper by Dr. Lange, on the cartography of the Brazilian province of Santa Catharina, and the continuation of Admiral Fleuriot de Langle's article on African migrations.

THE new *Bulletin* of the Geographical Society of Oran, Algeria, is largely occupied with the Trans-Saharan Railway. The question is dealt with from a commercial point of view, and among the other contributions to the subject is a note on the western route and that proposed by General Colonieu.

THE new number of the *Bulletin* of the Société de Géographie Commerciale of Bordeaux contains the first portion of an address delivered by M. Seillel on the Trans-Saharan railway project, in connection with which he is about to undertake explorations in West Africa.

THE publication of a new geographical journal is announced, the *Revista Geografica Internazionale*. It will appear fortnightly, and will contain original articles in Italian, English, French, and Spanish, not a happy group, we think; French, English, German, and perhaps Italian, would have been much more representative. The editor is M. A. M. Mizzi, and the journal is published at Malta.

PHYSICAL NOTES

AN attempt is made in *L'Electricité* by M. C. E. Séguin, fils, to claim for France the honour of the invention of the phonograph; firstly, by the plea that M. Léon Scott (who died only last July) patented the instrument under the name of the phonautograph in 1857, and secondly, by the statement that M. Charles Cros deposited before the Académie des Sciences, in April, 1877, seven months before the date of Edison's patent, a sealed packet describing the possible reproduction of sounds from recorded traces. In justice to Mr. Edison, we can hardly admit the validity of either of these claims. The phonautograph of M. Scott merely recorded the graphic traces of vibrations in sinuous scratches upon a smoked surface, which, therefore, was useless for the purpose of reproduction of the sounds; and, moreover, Dr. König, who worked upon the instrument with M. Scott, and perfected it, has stated to us most candidly that the idea of reproducing the sounds from the recorded traces never occurred either to M. Scott or to himself; and that neither of them attempted or proposed to obtain graphic traces in hollows and ridges in tinfoil or soft metal, or otherwise than as plane curves. And as for the claims of M. Cros, we have yet to learn that he constructed an actual phonograph, or that his sealed packet contained any descriptions of a sufficiently detailed or practical nature to enable any instrument to be made from them.

PROF. BORLINETTO, of Padua, has devised two very simple and effective pieces of apparatus for showing the passage of electric sparks through such non-conducting liquids as turpentine, petroleum, &c. They consist of U-tubes of glass, with or without an intermediate branch, and having platinum wires led down the two branches or introduced through the glass walls, so as nearly to meet, the other extremities of which can receive the discharge from a Leyden jar or from an induction-coil.

To study the fluorescent spectrum many physicists adopt the method of projecting a spectrum sufficiently pure to show the principal Fraunhofer lines, on a fluorescent body, solid perhaps, or the side of a glass vessel containing a fluorescent liquid, and determining the parts where the fluorescence appears, reaches a maximum, and disappears. Others develop the direct spectrum on the surface of a liquid; Herr Hagenbach places the slit and the prism horizontally, and projects the spectrum on the free surface of the liquid. The disadvantages of these two methods M. Lamansky (*Jour. de Phys.*, Dec.) has sought to avoid in a spectroscope he has had recently constructed by M. Duboscq, and which he finds very convenient. The collimator and the telescope of this direct vision spectroscope are fixed separately on a graduated circle; they may be placed at various angles in the vertical plane. The collimator is furnished with a small adjustable mirror for directing the luminous rays along the optic axis. In the prolongation of the collimator tube is placed the direct-vision prism and a lens which throws the spectrum on the surface of the liquid contained in a small vessel on a table which can be raised or lowered. The telescope is directed to the same liquid surface, and the focal distance of the ordinary telescope is shortened by the addition of a second object-glass, which may be removed at will. The division of the circle allows of determining the angles at which the coloured rays fall on the liquid surface and the angles at which the fluorescent spectrum is observed. A dark cloth may be thrown over the apparatus to exclude disturbing light.

An interesting observation on the supernumerary or spurious rainbows occasionally seen lining the inner edge of the primary arc of a rainbow has been made by M. Montigny. These supernumerary rainbows usually consist of a red band touching the violet on the inner side of the bow, followed by green and violet, and passing again to red. Indeed it is possible occasionally to observe as many as four or five recurrences of the red and green tints. They are, however, almost always confined to the highest portion of the bow, and are rarely observed near the ground. M. Montigny, on August 30, 1879, watching a rainbow near Rochefort, a little before sunset, noticed that while the upper portion of the primary bow showed no trace of supernumerary bows, the lower portions on each side, which came out brilliantly against a stratum or zone of misty air, were furnished with no fewer than four supernumeraries of paler tint. According to the received theory of Young and Airy these bows are due to diffraction, caused by very small drops, the smallest drops giving the broadest and most brilliant fringes of colour. Usually it happens that in the higher regions of the air the falling drops are smaller than they are at the lower regions; hence the occurrence of supernumerary arcs at the upper part of the bow. In M. Montigny's observation, doubtless, the misty zone lying near the ground provided the drops of the requisite degree of smallness to produce the diffractive effects. This is, at least, his view of the case.

In the December number of *Silliman's Journal* is a memoir of extreme interest by Dr. E. L. Nichols on the character and intensity of the rays emitted by glowing platinum. Several tables of statistics of observations are given, and two graphic charts which embody the tabular results. Reviewing the *a priori* law of Kirchhoff, concerning the emission of rays of greater refrangibility at higher and higher temperatures, he remarks: "Strictly speaking, however, the temperature at which each individual wave length becomes visible depends solely upon the sensitiveness of the observer's eye. We are furthermore forced to conclude from experiment that the more refrangible rays really exist at temperatures far below those at which we begin to see them. The directions of the curves (Plates I. and II.) seem to denote that all the rays studied begin to be emitted at some temperature not included in the interval embraced by the experiments. I suspect indeed that all of them originate at some very low degree (the absolute zero?), and are recognizable no sooner, simply because the various instruments at command, the thermopile, eye, photographic plate, &c., are not more delicate. That the various colours do not appear simultaneously, follows from the very different degrees of sensitiveness shown by the eye for different rays."

An interesting electric toy, contrived by M. Pfeiffer, is described in a recent number of *La Nature*. It is a small electrophorus consisting merely of a thin plate of ebonite about 1 mm. in thickness; the usual wooden disk with tinfoil is replaced by a small piece of tin about the size of a playing-card, attached to one of the faces of the ebonite plate. This electrophorus produces

electricity with great facility. You have merely to place it on a wooden table and rub it successively on its two faces with the open hand; then on lifting it with the left hand and bringing the right hand near the tin plate, a spark is obtained 1 to 2 centimetres long. Several small accessories, skilfully contrived, are added to the electrophorus; among these are dancing puppets made of pith, which manifest very amusingly the phenomena of electric attraction or repulsion. Electrify the ebonite plate, put the three puppets on the tin, and then raise the plate from its support. One small personage lifts his arms above his head; the hair of a second stands out; and the third, lighter than the others, jumps about like a clown, while two pith balls placed at his side dance with him. M. Pfeiffer has also collected in one small box all the known accessories of an electric machine; a miniature Leyden jar, an electric carillon, a Volta pistol, a Geissler tube, &c., these being operated with the electrophorus.

SCIENTIFIC SERIALS

American Journal of Science and Arts, December, 1879.—Mr. Brooks here calls attention to an important difference in the breeding habits of American and European oysters; the eggs of the former are fertilised *outside* the body of the parent; and during the period which the European oyster passes inside the mantle cavity of the parent, the young American oyster swims at large in the open ocean. Mr. Brooks traces the successive stages of oyster development.—Mr. Harting writes on triple objectives with complete colour-correction.—There are geological papers on Virginia, on Galisteo Creek, New Mexico, and on Catrosa Co., Georgia.—Prof. Verrill describes two new species of cephalopods caught off the coast of Massachusetts; also what is the second known representative of the remarkable family of *Cirroteuthide*.—Dr. Nichol's researches on the character and intensity of the rays emitted by glowing platinum (see *NATURE*, vol. xxi. p. 184) are here given in detail.—Prof. Marsh's notes on Jurassic dinosaurs, and Dr. Draper's researches in photography of stellar spectra have been already noticed in our columns.—Prof. Peters contributes observations on the planets Hersilia and Dido; and in the "Scientific Intelligence" we note two useful lists of the (209) minor planets, numerical and alphabetical.

SOCIETIES AND ACADEMIES LONDON

Royal Society, January 8.—"On the Photographic Method of Mapping the Least Refrangible End of the Solar Spectrum (with a map of the Solar Spectrum from 7600 to 10750)," by Capt. W. de W. Abney, F.R.S., R.E.

The author refers to the sensitiveness of different forms of silver salts when exposed to the action of the spectrum, and shows how he has been able to prepare, by methods indicated, silver bromide which absorbs the red and ultra-red rays, and which is sensitive to these rays.

In his paper he describes the apparatus employed by him in the photography of the invisible least refrangible rays, both with a prismatic, and also with the diffraction apparatus. From photographs taken with the latter, he has constructed a map extending from λ 7600 to λ 10750, which he submits to the Society. He shows also that in the photographs of the prismatic spectrum, he has apparently reached the limiting length by comparing it with photographs of the diffraction spectrum. The author has also compared Laman-ky's prismatic thermograph with his photograph. The paper closes with some theoretical remarks on the silver compounds employed.

Mathematical Society, January 8.—C. W. Merrifield, F.R.S., president, in the chair.—Prof. W. S. Burnside was elected a Member.—Prof. Cayley, F.R.S., communicated two formulæ in spherical trigonometry which are included in the one form—

$$\tan \frac{1}{2} c (\cos B - i \sin B) = \tan \left(\frac{c}{2} - \phi \right)$$

where

$$i = \sqrt{-1} \text{ and } \tan \phi = \tan \frac{1}{2} b (\cos A + i \sin A).$$

The note which the President read at the last meeting simply gives (as has been pointed out to him since) some symmetrical cases of the orthogonal transformation, of a much more general character (but unsymmetrical) given by Mr. Cayley, and reproduced in Salmon's "*Higher Algebra*" (3rd edition, p. 39). The symmetrical form may be obtained from the one there given by writing—